Begg Cousland

World Class Filtration Solutions

Mist Elimination & Gas Cleaning Equipment for the Chlorine & Chlor-Alkali Industries

Begg Cousland's Filtration Technology

Begg Cousland filters have been used in the field of Industrial Air Pollution Control for more than 60 years. As the first company in the world to make both knitted wire meshpad demisters and candle filter mist eliminators, we have a unique length and depth of experience in the collection of liquid particles from air / gas streams.

Begg, Cousland's 'BECOFIL' Candle Filter Mist Eliminators are widely used in chlorine plants throughout the world. Our supplies include glass fibre, polypropylene and polyester fibre filter elements, stainless steel, titanium or resin coated GRP cages and flanges.

In addition to the base technology of gas / liquid filtration, we have design know-how for complete gas cleaning packages, comprising vessel, irrigated scrubber sections and associated equipment.

CHLORINE PLANTS

Process Technology

Electrolysis of brines in a diaphragm (or mercury) cell with chlorine produced at the anode and hydrogen together with sodium or potassium hydroxide at the cathode.

Diaphragm Cell

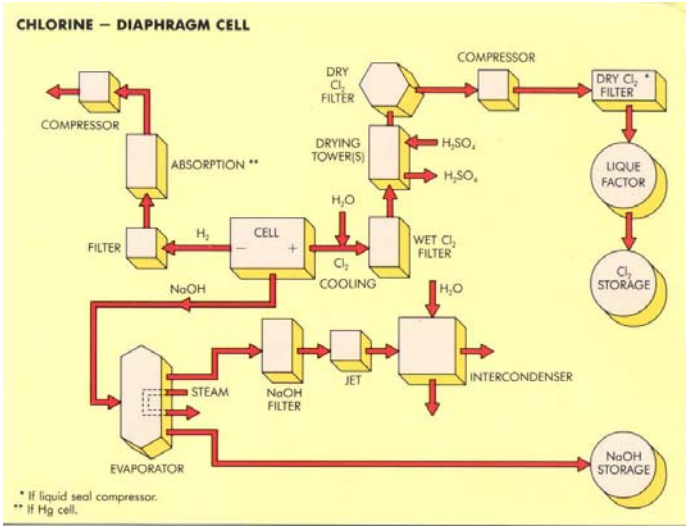
The diaphragm cells contain a porous asbestos diaphragm to separate the anode from the cathode. This allows ions to pass through by electrical migration but reduces diffusion of products.

Anodes are graphite or Titanium Cathodes are steel wire.

Overall reaction:
NaCl + H2O - NaOH + 1/2 H2 + 1/2 Cl2

If OH^- reaches the anode, hypochlorites are formed with subsequent loss of chlorine.

The oxygen will attack the graphite and chlorinated HC are entrained in chlorine gas.



Mercury Cell

Many plants had mercury cells, where brine is partly decomposed in the electrolyzer between a graphite anode and a mercury cathode forming chlorine gas at the anode and sodium amalgam (NaHg) at the cathode.

The amalgam flows to the decomposer box where it becomes the anode to a short-circuited iron or graphite cathode in an electrolyte of sodium hydroxide solution.

Purified water is fed to the decomposer; where hydrogen is formed and the NaOH concentration increases. Hg is recycled to the electrolyzer.

Chlorine Gas Stream

When the Chlorine gas leaves the Diaphragm Cell, it is cooled and then dried in a Drying Tower by contact with Sulphuric Acid. Before the chlorine gas is dried Wet Chlorine filters should be installed.

Application 1. Wet Chlorine Gas Filtration

Mist Formation/Nature/Load

NaCl is entrained from cell; chlorinated HC (if graphite anode) are also entrained. Water (when direct cooling) saturates the gas stream.

Typical load: 800 - 3500 mg/Nm³

Problems to Solve

Filters are installed before the drying tower :

- To prevent NaCl blockage of downstream equipment
- To collect chlorinated HC, therefore to increase final product purity and prevent plugging of drying tower;
- To collect water to decrease sulfuric acid consumption in the drying tower.

Wet Chlorine Gas filter with GRP structure

Design Solution

We offer TGW15 or B14W Glass Fibre mist eliminators for this duty, (although some plants still use our PP12 Polyester / Terylene fibre) with a structure made of Titanium, or GRP/FRP with Derakane or Atlac resin coating
Usually a hanging filter style, either HT1 (gas upwards, and passing the filter from outside to inside) or HT2 (gas downwards then horizontal, and passing the filter from inside to outside)

Application 2. Dry Chlorine Gas Filtration

Mist Formation/Nature/Load

H2SO4 entrained from drying tower and compressor (if liquid seal compressor)
Load: up to 7000 mg/Nm³ (if liquid seal compressor)

Problems to Solve

Filters are installed after drying tower or after the liquid seal compressor to collect sulfuric acid mists which :

- Impact product purity
- Freeze on tubes of liquefied decreasing heat exchange.
- Cause compressor corrosion

Design Solution
Type HT1 or Type HT2 hanging style mist eliminators
TGW15 or B14W glass fibre in 316L SS structure

Application 3. Hydrogen Stream Filtration

Mist Formation/Nature/Load

NaOH is entrained from cell.
If mercury cell Hg sprays and vapour are present in the gas stream.
Typical load NaOH : Max: 2000 mg/Nm³
Hg : Max: 200 mg/Nm³

Problems to Solve

Hydrogen is usually compressed for miscellaneous use
Filters are installed after cell to collect NaOH and Hg mists which :

- impact H2 purity
- corrode compressor
- decrease life of active charcoal system
  - to remove mercury vapour (mercury cell).

Design Solution

PP15 polypropylene fibre with 316L SS structure.
Highest efficiency.

Application 4. NaOH Stream Filtration

Often NaOH is concentrated from 50% or lower strength up to 70%. This operation is carried in a high vacuum concentrator. Vacuum is generated by jet system with water intercoolers.

Mist Formation/Nature/Load

NaOH is entrained by the jet system up to 2000 mg/Nm³.

Problems to Solve

Filters are installed before jet system to collect NaOH mists which mix with the water of intercondenser and create water pollution problem.

Design Solution

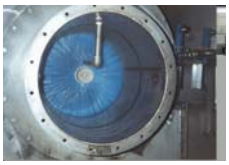
PTFE fibre in a 316L SS Cylindrical candle filter structure or Panel filter form.

Application 5. Cell Room Vent Filtration

Mist Formation/Nature/Load

Weak Hydrogen gas is entrained from Cell Rooms with Hg particles and some Chlorine gas, in the ventilation air. Solid Mercurous Chloride (Calomel) particles are present.

Problems to Solve



Air Pollution

Design Solution

Becoflex Rotary Brush Scrubber in PP/FRP, a self-cleaning, air moving, low-liquid NaOH scrubber system.

Application 6. Soda Ash Bagging Filtration

Mist Formation/Nature/Load

700mg/m³ of Soda Ash emitted from wagon loading and bagging operations

Problems to Solve

Air Pollution
Product Loss

Design Solution

Becoflex Rotary Brush Scrubber in Carbon Steel, a self-cleaning, air moving, low-water volume scrubber system.

(For more details on Becoflex, see separate *Becoflex & Scrubbers* brochure)

For further information, please contact us at

Begg Cousland Envirotec Ltd.

205 White Studios,

62 Templeton Street,

Glasgow G40 1DA

United Kingdom

Tel + 44 141 556 2289

Fax + 44 141 550 1653

E-mail : info@bcenvirotec.com

Web : www.beggcousland.com